# GENERATIVE AI AND RESEARCH

"Generative AI" refers to artificial intelligence capable of generating new content. It can write essays, solve complex problems, make images, create code, compose song lyrics, do homework, and much, much more—all in response to a user's prompt. When it comes to using generative AI, young people are way ahead of us! According to the report AI Chatbots in Schools, nearly half of K–12 students use one of the most popular generative AI tools—ChatGPT—at least once a week. Another study, Teens, Parents, and the Adoption of Generative AI at Home and School, reveals that 7 in 10 U.S. teens have used generative AI, with over half turning to it primarily for homework help.

While educators have valid concerns about students using AI to bypass learning—such as having it write essays or complete assignments—the reality is that generative AI is becoming a permanent part of the learning landscape. In this lesson, students will explore what generative AI is, understand its limitations and risks, and learn how to use it responsibly and effectively.

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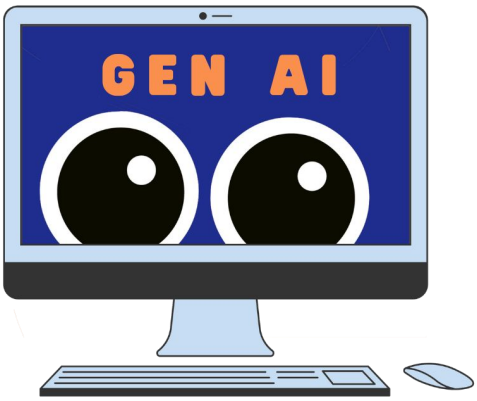
## KEY STANDARDS




ISTE Standards: Empowered Learner (1.1.d), Digital Citizen (1.2.b, c), Knowledge Constructor (1.3.a, b, d).
CASEL Competencies: Self-management (2.a c), Relationship Skills (4.a, b, d), Responsible Decision-making (5.a, c, d, e, f).
CCSS.ELA-LITERACY: 7th: SL.7.1, SL.7.2.

## LEARNING OBJECTIVES

Students will…

- ✓ Learn what generative AI is.
- ✓ Explore the downsides of using generative AI for research or schoolwork.
- ✓ Discover how they might use generative AI tools responsibly and ethically.

## INTRODUCING THE LESSON

Explain that you are now going to be exploring a particular type of AI called "generative AI."

Ask: *Has anyone heard of generative AI? Can anyone explain what it is or think of an example of a generative AI tool?* Students may mention ChatGPT, Gemini, Claude (text generators); DALL-E, Midjourney (image generators); Synthesia (video generator), or many, many others!

## THE LESSON

1. Explain that generative AI is a type of artificial intelligence that can generate new content—such as text, images, music, video, and code—based on patterns it has learned from existing data.

2. When you give a generative AI tool (such as ChatGPT) a prompt (for example, 'explain why dinosaurs became extinct'), the underlying LLM (large language model) uses patterns learned from its training data to generate a conversational response that fits your request. That's why these tools are referred to as "chatbots."

3. Explain that some, but not all, generative AI tools are built on an LLM (Large Language Model) which, in simple terms, is a computer program that has been trained on massive amounts of text to learn how language works. (Be sure to review and share "Terms To Know" with students.)

4. To help students better understand generative AI, read (and/or show) this prompt: *How would you describe ChatGPT to a 7th grader?* Tell them it generated this answer:

> Imagine ChatGPT as a super-smart robot that can have conversations with you. It's like a computer program that knows a lot about many things because it has read tons of books, articles, and websites. You can ask it questions, tell it to help you with homework, or even chat about your favorite hobbies, and it will try to give you helpful and interesting answers. It's like having a really knowledgeable friend who is always ready to talk and help you out!

5. Ask: *Has anyone ever used a generative AI tool for research or schoolwork? If so, which one did you use? How did you use it?* Discuss.

6. Explain that while generative AI is pretty amazing—it's not perfect! It doesn't really "think" the way humans do. Sometimes it makes mistakes or gives answers that are outdated, incomplete, or even wrong. Review the following downsides of generative AI and be sure to discuss each one.

   - It can make things up

   Generative AI can provide information that sounds believable but is not correct. This is called a 'hallucination'—it means the AI tool made up a fact or detail. For example, a fake science term—"vegetative electron microscopy"—started appearing in published papers because AI had picked it up from a mistake it had trained on (remember AI trains on data found on the Internet). Even though the term sounds smart, it doesn't actually mean anything!

   Sometimes generative AI responses include sources (the names of authors and articles) that are completely made up and don't even exist! For example, a respected Stanford professor with genuine expertise used ChatGPT to generate a report for a court case he was involved in. The judge threw out his entire testimony because his report included made-up citations. The incident completely shattered the professor's credibility.

## THE LESSON, cont.

This shows that everyone, including experts, has to be careful when using AI, because it can sometimes generate made-up information.

- It Might Leave Out Sources

Sometimes generative AI tools provide answers without telling you **where** the information came from. This makes it hard to check to see if the information is reliable. For example, say you ask for five facts about sea turtles, a generative AI tool may give you five facts but not tell you which websites or books those facts came from.

- There Might Be Bias

Bias is a prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair. Generative AI is sort of like a copy machine—it copies what it sees online, even if what it sees is biased towards one thing or another. For example, let's say AI has trained on data primarily about road bikes and not mountain bikes, how might it be biased if you asked about, say, bike tires?

Ask: *What are some other, more concerning, biases that might occur when using generative AI?*

- It Can Be Plain Wrong

Because AI trains on the Internet, it can "learn" from incorrect information, too! These tools try to guess what you want and then predict what the best answer may be based on all of the available information it has trained on (including the previous questions you and others have asked!). When using generative AI you'll need to step in, do extra checking, and make sure what you get is actually correct.

- It Could Lead to Plagiarism

Because generative AI tools train on the work of others, they raise some important ethical considerations regarding plagiarism. Explain that you will be exploring this in a future lesson.

- It Might Be Shallow

Generative AI does not delve deeply into complex topics and therefore often lacks the depth that comes from deep scholarly work. It sometimes misunderstands questions, and cannot generate new knowledge or novel insights. Only humans can do that!

Tell students that while generative AI can be a useful research assistant—it is not a replacement for thinking and checking things out on your own.

## THE LESSON, cont.

7. Share what generative AI *is* helpful for when doing research:

    - Finding Ideas or Brainstorming Topics. AI is great at helping you come up with ideas when you're not sure where to start. Example: You're writing about climate change, but don't know what part to focus on. You might write this prompt: "I am doing a report on climate change, can you suggest areas I could focus on?" AI might suggest, "causes of climate change" or "how climate change affects animals."

      Analogy: AI is like a brainstorming buddy—it helps generate ideas to think about, but you still have to choose the best ones.

    - Summarizing Information. AI can take a lot of text and explain it in a simpler way. Example: You find a long article and ask AI to summarize it in three sentences.

      Analogy: AI is like a highlighter—it helps you see the most important points, but you still need to understand what they mean.

    - Explaining Vocabulary or Concepts. AI can define words or explain things like "photosynthesis" or "civil rights" in a way that's easier to understand. However, you need to cross-check any information that you get from AI, as it sometimes makes mistakes.

      Analogy: AI is like a smart dictionary that provides explanations in simple language.

8. Review five smart ways to use generative AI:

    - Use it to brainstorm, not to copy.
    - Check facts using other reliable sources (like books, websites, or your own school library).
    - Ask for sources or links if AI gives you facts. Check those sources and links.
    - Talk to a teacher, librarian, or parent if you're not sure something is true.
    - Always do your own thinking! AI helps, but you're the one in charge.

9. Conclude by telling students not to be tempted to always go for the quick answers provided by AI. Do their own research. This includes using traditional search engines, and writing good search queries to research a topic. Unlike a summary provided by an AI tool, search engines provide a list of websites that they can visit and check out themselves.

    By checking a lot of different sources, students can decide for themselves which ones are trustworthy. They will also get to view different opinions and viewpoints, and be able to dig deeper. Tell students: AI might save you time, but don't let it save you from thinking!

## THE ACTIVITY

Spot the Hallucination. Give your students the Student Packet and have them (either individually or in pairs) read the short paragraphs that were generated by AI. Ask them to detect the hallucinations by researching the paragraphs using a search engine. They should also provide the correct information using credible sources. If students do not have access to devices in the classroom, you can assign this for homework or conduct the search for them and discuss.

Answer Key (for Teachers)

1. Recycling Example:

   - There is no such law as the "National Recycling Act" passed in 1985 in the United States. While recycling programs grew in the 1980s, no federal law by that name or with those requirements was enacted.

2. Schrödinger Example:

   - Erwin Schrödinger did win the Nobel Prize in Physics in 1933, but it was shared with Paul Dirac for the discovery of new productive forms of atomic theory (specifically, for wave mechanics).

   - The uncertainty principle is attributed to Werner Heisenberg, not Schrödinger.

3. Supreme Court Case Example:

   - There is no Supreme Court case called Smith v. Jones (2012) regarding cell phone searches.

   - The real case is Riley v. California (2014), which did set the precedent that police need a warrant to search a cell phone during an arrest.

   - The opinion in Riley v. California was written by Chief Justice John Roberts, not Justice Sonia Sotomayor.

## GOAL

Students will understand what generative AI is and how it works, and will discover its shortcomings. They will also gain tips on how to use it wisely for schoolwork and research.

Your Name(s): _____

_____

## FOR STUDENT

Read and research the following AI-generated paragraphs by using a search engine. If you detect any hallucinations or misleading information, circle them and then provide the correct information using credible sources.

*AI-Generated Paragraph*

In 1985, the United States passed the National Recycling Act, which required every city to provide recycling bins to all households (Environmental Protection Agency, 2023). This law helped reduce waste in landfills and encouraged people to recycle more materials like paper, plastic, and glass.

Provide the correct information using credible sources:

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*AI-Generated Paragraph*

Erwin Schrödinger was awarded the Nobel Prize in Physics in 1933 for his development of the uncertainty principle, a fundamental concept in quantum mechanics that describes the limits of precision with which certain pairs of physical properties can be known.

Provide the correct information using credible sources:

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_____

*AI-Generated Paragraph*

The Supreme Court case Smith v. Jones (2012) established the precedent that police must obtain a warrant before searching a cell phone during an arrest. The decision, written by Justice Sonia Sotomayor, was unanimous and has been cited in numerous privacy cases since then.

Provide the correct information using credible sources:

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FOR STUDENT

# TERMS TO KNOW

## GENERATIVE AI

A type of artificial intelligence that can generate new content—such as text, images, music, video, and code—based on patterns it has learned from existing data.

## PROMPT

A specific question or detailed instruction you give to a generative AI system to generate a response.

## LLM (Large Language Model)

A computer program that has been trained on massive amounts of text to learn how language works.

The key parts of the name:

Large = trained on huge amounts of text
Language = focuses on understanding and generating human language
Model = a computer program that learned patterns from data

## CHATBOT

A software program designed to simulate conversation with human users.

The word breaks down into:

Chat = having a conversation or dialogue
Bot = short for "robot," meaning an automated program that can perform tasks